RAP4

THE OFFICIAL RAP4 USER'S GUIDE

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CHAPTER 1

AN INTRODUCTION TO RAP4

WHAT IS RAP4?

RAP4 is a complex sound sampler/digitiser for the Commodore Plus/4 computer. Digitising or Sampling is the process by which any sound such as a person speaking or a doorbell ringing can be translated into a set of numbers which can be understood by a computer. Once this process has been performed, any number of things can be done to the sound including playing it back at any speed you care to choose, playing it backwards, and playing sounds in a set order to form a tune. RAP4 can do all these things as well as having comprehensive facilities for editing or altering any sound. Before we continue, however, I must stress that you should not expect to be able to record half an hour of compact-disc HIFI quality sound as the length and quality of sound is limited by the 64k memory and relatively slow processing speed of the Plus/4 computer. Even using very powerful computers with at least eight times the memory, no-one has really broken the twenty-minute barrier of reasonable quality sound.

RAP4 is unique in several respects. At the time of release, there is no other sound-sampler available for the Plus/4, and no other sampler is avaiable for any computer at less than four times the price. The other unique aspect is that RAP4 is operated in a pointer-driven environment such as those found on the Apple Macintosh™, the Commodore Amiga™, and the Atari ST™. By means of this human to computer interface, RAP4 is incredibly easy to use, and anybody of any age can master the system in an hour or so.

If you have already had experience of a WIMP™ type system, then feel free to skip the next section. For those who haven't, it explains the basic concepts of a pointer-driven environment along with all the jargon attached to it.

THE RAP4 OPERATING ENVIRONMENT

Although the operating environment RAP4 uses (a variation on the WIMP™ operating system) is very easy to use, it is helpful to know a little of the special names given to objects and actions that are used. A glossary of these is shown below.

The Pointer. The pointer, which appears as a black arrow pointing north-west, is a sprite which forms the heart of the system. It is moved around the screen by keyboard, joystick or mouse, and is used to select functions of the software by simply pointing at a word or picture and pressing a select button.

Buttons. Buttons are the means by which actions are activated. On-screen they appear as a word in reverse-video surrounded with a black border. To select the option which the word describes, move the pointer onto the rectangle (it doesn't matter where) and press the select button.

Windows. Windows are areas of the screen seperated from the remaining screen by a black shadowed border. It is within these areas that all information is displayed. In some windows, certain pieces of information are highlighted in reverse video to show selected data. To change this selection, the pointer is moved onto the chosen piece of data, and the select key pressed.

The Menu Header. The Menu Header is the bar of text which appears at the top of the screen. When you are in a section of the program other than the main screen, the menu header is replaced with a title describing the current section of the software.

Pull-down Menus. Pull-down menus are used to choose different sections of the software. On running RAP4 you will see the menu header at the head of the screen (SYSTEM, SAMPLE etc.) Linked to each of these is a menu which can be pulled down from the header by moving the pointer onto the heading and pressing the select key. Once a menu is on the screen, you will see several options with the first one highlighted. You can change the highlighted option by using the up and down control keys. To select this function press the select key. If you have pulled the menu down in error, select the function "Exit" which appears at the base of every menu.

"Clicking." Before in the explanation of the operating system I have talked of moving the pointer onto a button or option and pressing the select key. In future this will be referred to by its proper term which is to "Click" on something.

That concludes our examination of the RAP4 operating system. In the following chapters we will discuss the actions of actually getting the RAP4 software up and running.

CHAPTER 2

GETTING STARTED

CASSETTE CONTENTS

If you are using the cassette version of RAP4, you will have noticed that both sides of the cassette are labelled. On side 1 you will find the main part of the software, the Editor. We will concentrate on this part of the package now. On Side 2 you will find RAP4 BASIC - An extension to the normal Commodore BASIC which allows you to use sampled sounds in your own programs. This aspect is discussed in Section two of the manual.

LOADING THE RAP4 EDITOR

Tape Users. Place the RAP4 cassette in your Datasette and rewind the tape to the beginning of side 1. To load the program type LOAD and press return followed by the PLAY button on the Datasette. The screen should blank and after a while the screen should clear and after several seconds the phrase "RAP4 EDITOR" will appear in the top-left of the screen. To continue loading press the Commodore key (on the bottom-left of the keyboard). If all is well, after a while the screen should turn black and the border begin to flash red and yellow. A title screen will then appear and after another minute the RAP4 Editor main screen will be displayed.

Loading Problems. RAP4 uses a unique 2340 Baud hyperload system which means loading and saving takes place at around 15 times the speed of the normal Commodore system. However, to use this fast speed, the heads on your datasette must be aligned very accurately. Should you have any problems in loading the program, please send the cassette back to us. If it is faulty we will replace it and refund the postage. If however, the cassette is functional, we will offer to re-align your datasette free of charge.

Disk Users. Insert the RAP4 disk into your disk-drive and press the RUN/STOP key while holding down the SHIFT key. After a few seconds a title screen will be displayed with two options beneath. To load the Editor simply press the "1" key. The Option marked "(1) LOAD EDITOR" will begin to flash and after a little while the RAP4 main screen will be displayed.

Deluxe Edition Users. Plug your TTL4 interface into the Commodore serial port on your Plus/4 (the socket between the power connector and the tape port). If you have a printer or disk-drive plugged into this socket then connect the interface to the second socket on the back of the printer or disk-drive. This means of connection is also explained in your disk-drive manual. Now if you wish, you can connect a cassette-recorder or radio etc. to the other end of the interface.

Before you perform any disk or printer options such as loading the RAP4 editor, you must disable the TTL4 interface. This is done by rotating the "Input Level" control fully left. Now you are ready to load the editor.

LOADING THE RAP4 EDITOR (Cont.)

Deluxe Edition Users. (Cont.) To load the editor, insert the disk and press the RUN/STOP key while holding down the SHIFT key. After a few moments a title screen and menu labelled 0 to 2 should appear. Editor 0 is the standard editor for use with the Commodore datasette. If you wish to use this just press the "0" key and follow the normal disk instructions. If you wish to use your TTL4 interface select 1 and follow the special instructions in this manual. After another few seconds the screen should change to the editor main screen.

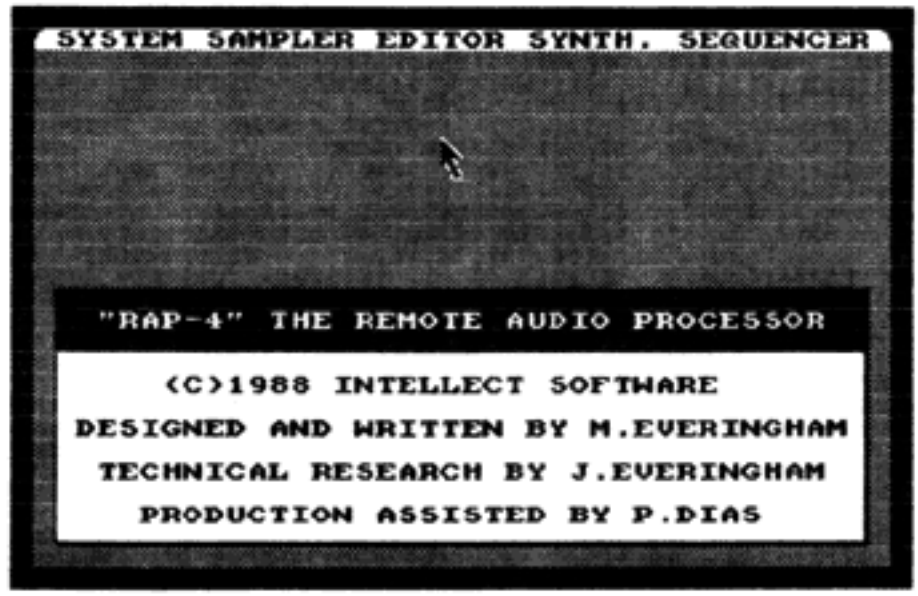
CONTROL PERIPHERALS

For controlling the pointer and selecting options on pull-down menus, you can use any of three controllers. If you do not have a joystick or mouse, or prefer to use the keyboard then you may control RAP4 using the cursor keys at the bottom right of the keyboard, and the RETURN key as a select button. If you have a joystick then you can use this with the fire button as the select button. If you have a mouse (Commodore 1351™, Datel™,Stack™) then you can also use this. If you are using a 1351 mouse then remember to initialise it in Joystick mode. The joystick or mouse should be connected to Joystick port 1 which is the socket closest to the cartridge port on the back of the Plus/4. There is no need to select which peripheral you wish to use - You can use any of them seperately, or even two at once if you like!

At this point you should have the editor up and running and a basic knowledge of how to control it. Next, we will start to use RAP4 properly.

CHAPTER 3

STARTING TO USE RAP4



On loading the RAP4 Editor you will presented with the screen shown above. At the top is the menu-header with the various program options. In the lower section of the screen is a title window displaying information about the production team, and in the centre you can see the pointer.

CHANGING THE POINTER SPEED

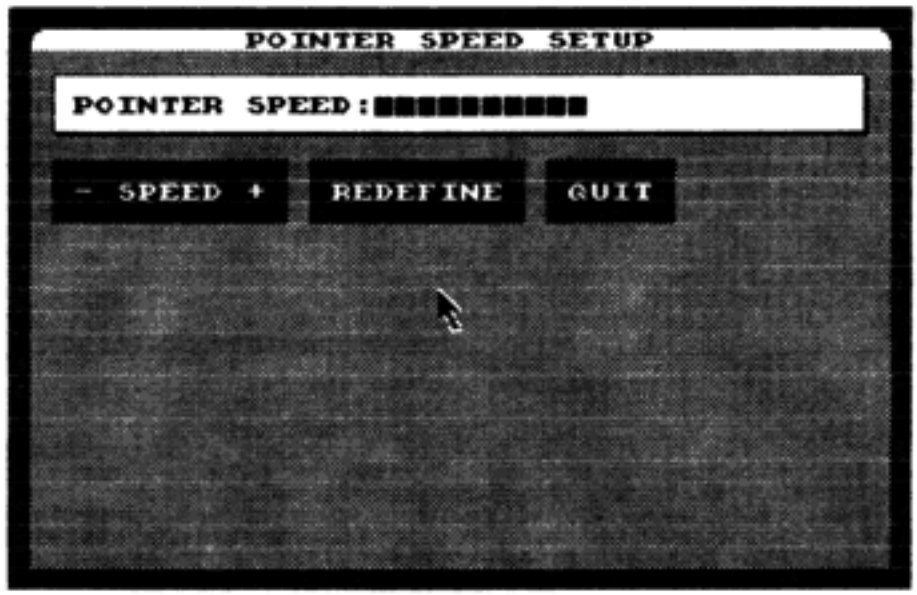
When the editor is first used, the speed at which the pointer moves is set quite slow so that anyone can control it. We will now learn how to change this speed setting to the one you require.

Move the pointer onto the "SYSTEM" option at the left of the menu-header. When you click on this word, the SYSTEM menu is pulled-down, with four options: SPEED (Highlighted), STORAGE, ABORT and EXIT. The highlighed option can be changed by using the up and down controls. To operate one, press the select button. Selecting EXIT simply returns you to the main screen without doing anything. You will notice that while changing options, you must repeatedly press and release the up and down keys, or waggle the joystick. This is so that even if you have a very fast pointer speed, you can still easily control the menu.

To select the speed option, move the highlight bar back up to the top of the menu and press the select key.

CHANGING THE POINTER SPEED (Cont.)

After selecting the speed option you should be greeted with the screen shown below:-



Replacing the menu-header is a title describing what the screen is for doing. Below this is a window in which the current pointer speed is displayed as a bar-graph type display. On start-up this is set to ten - Quite a slow, manageable speed. Below this window are three buttons which I will now explain.

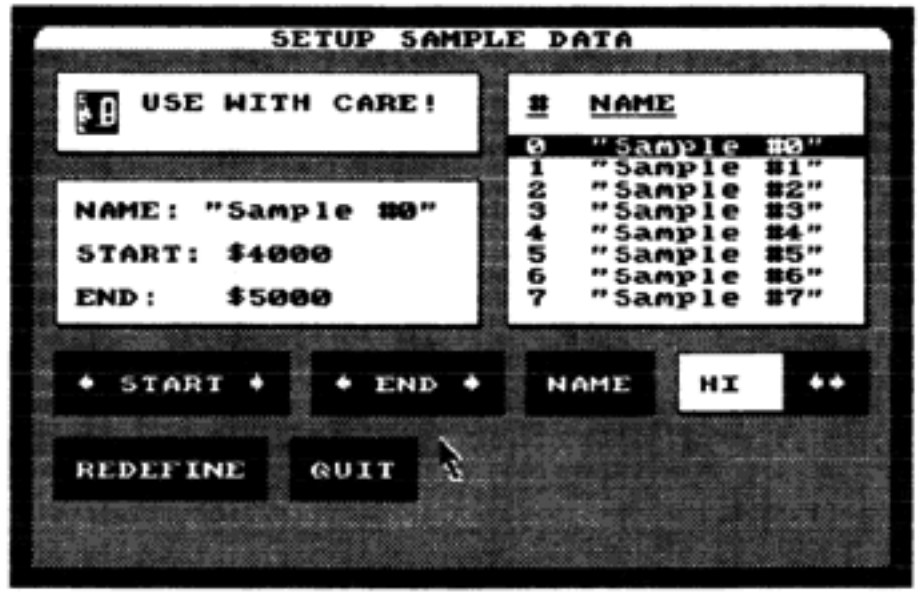
The button on the left is actually split into two halfs - to the left of the text "SPEED" and to the right. Clicking on these decrease and increase the pointer speed setting. You can hold down the select button to change the speed quickly.

You will notice that while you have been changing the pointer speed, the pointer movement has not actually been getting faster or slower. Once you have chosen the speed you want, you "lock it in" by clicking on the REDEFINE button. Again, this is an operation that is common to many actions within RAP4. It stops you from changing settings by mistake, and makes changes much easier to make.

When you have chosen a speed-setting that is about right for you, click on the QUIT button to return to the main menu.

SETTING-UP SAMPLE DATA

Before you record a sound or "Sample", you must first tell RAP4 where in memory it is to store it. This is done by means of the SETUP option which is the first option on the EDITOR menu. Select it as explained before and the screen display will change to that shown below.



This is quite a complicated screen. It is also a screen from which you can damage data, so a suitable warning ia displayed in the top-left of the screen. In the top-right of the screen is a window which shows the current names of all the eight samples that can be set-up. When RAP4 is first run the names are set to "Sample " + the sample number. This window is used in almost all of RAP4's screens and is used to change the currently selected sample. This is done by clicking on the name or number of the sample you require. For the moment leave it as it is, with sample 0 selected.
On the left of the screen is a window with the words "Name", "Start" and "End" in it. "Name" refers to the name attached to the highlighted sample. "Start" is its start address, shown in hexadecimal, and "end" is its end address, also in hex.
You will see that there are two rows of buttons. The top row marked START and END work in the same way as the SPEED button in the Speed screen, and are used to increase and decrease the start and end addresses. Next to this is a button marked NAME which I will discuss later, and next to this is a combination of window and button which should show the word "HI". If you click on the double-arrow button, you will see that the text changes between "HI" and "LOW". This button is known as a toggle button and is used to select whether when changing the start and end addresses the LOW byte or the HIgh byte is altered. Effectively, this determines whether the address is incremented in steps of one, or 256. For the moment make the start as low as possible and the end as high as possible.

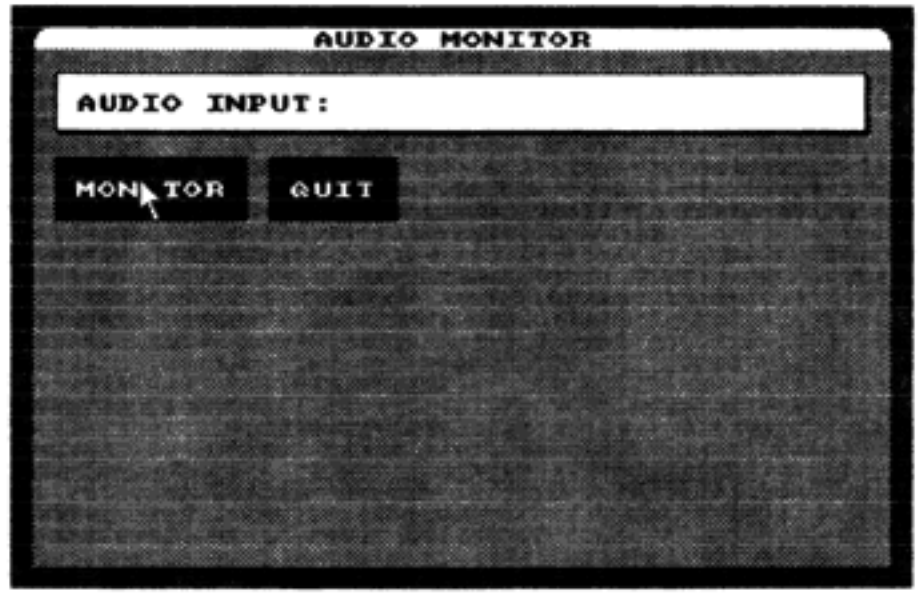
SETTING-UP SAMPLE DATA (Cont.)

I have mentioned the NAME button which is found next to the END button. Click on this and a window should appear in the bottom-right of the screen with "NAME:" in it, and a flashing line. This line is called the I-Bar and is the cursor used in RAP4 when entering string data. Type in the name you want to give your sample, for example if you are going to record the sound of a doorbell ringing then type in "doorbell", and then press the RETURN key. The window will disappear and the name you typed in be printed in the window on the left of the screen next to the "NAME:" text. You will notice that the name in the sample information window on the right has NOT changed. This is because like the Speed option, any changes are not made permanent until you click on the DEFINE button on the second row of buttons. Click on this button now.

You have now allocated some room in which to store a sound. You can record up to eight of these samples spread across the 48k free when using RAP4. When you first run RAP4, 4k of memory is allocated to each sample. You have also given the sample a name, which will remind you what is stored there in the future and will be used when you save it to tape or disk. Now, we are ready to actually digitise some real sound, so click on the QUIT button to go back to the main control screen.

MONITORING A SOUND

From the main screen, click on the word SAMPLER in the menu-header and select the MONITOR option from the pull-down menu. This option is used for seeing what is on a cassette and for positioning a tape in preparation for recording a sound. The screen will change to the one shown below.



At the top of the screen is a window marked AUDIO INPUT which will at the moment be empty. In this window, the sound entering the computer is displayed in a bar-graph form similar to the one used for speed selection.

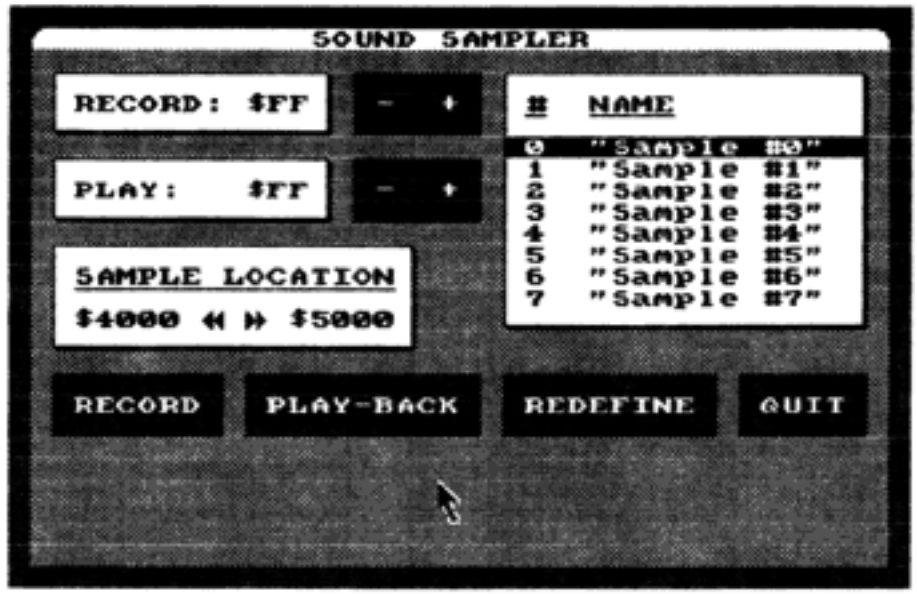
Underneath the Audio Input window are two buttons. The now familiar Quit button, and one marked MONITOR. Click on this and follow the individual instructions that follow.

Standard Edition. When you click on the MONITOR option a window will appear at the base of the screen telling you to press play on your datasette. Place a tape in the datasette and press the PLAY button. The window will be replaced with a window telling you to press the stop key on the datasette when you have finished monitoring the tape. Any sound on the tape will then be reproduced through your television or monitor speaker, and will be displayed graphically on-screen. Wind the tape until you reach the sound that you wish to record, then press STOP on your datasette and click on the QUIT button.

Deluxe Edition. On clicking on the MONITOR button a window will appear telling you to push the RUN/STOP key when you have finished monitoring. Now turn your TTL4 interface on, place a cassette in your tape-recorder, or connect a radio, and then adjust the input-level control on the interface until you get the best quality sound. Then if you are using a tape-recorder, wind the tape to the sound you wish to record. To finish, press the RUN/STOP key and click on the QUIT button.

USING THE SOUND SAMPLER

From the main menu, click on the word SAMPLER in the menu-header and select the SAMPLER option from the pull-down menu. The screen will change to the one shown below.



In the top-right is the sample information window we met in the Setup screen. In the middle of the screen on the left is a window marked "Sample Location" which shows the start and end addresses of the currently selected sample. In the top-left are two windows - one displays the speed at which the sample will be recorded, and the other the speed at which it will be played-back. Both values are shown in hexadecimal. You can increase or decrease these by clicking on the buttons next to them in the same way as for the Speed or Setup options. If you use a low recording speed, you can record a longer sound, but the quality will not be as good as when using a very fast recording speed. Usually the playback speed will be the same as the recording speed, but if you want to make "smurf" type noises, or change the frequency of the sound, then you can record a sound at one speed and play it back at another. For the moment, leave these settings as they are. For a full list of recording times, sampling speeds and bandwidths (frequency response) see Appendix C at the back of this manual.

In the lower part of the screen is a row of buttons two of which you will recognise. REDEFINE is used to lock the record and playback speeds to the currently selected sample so that you don't have to keep on resetting them every time you use a different sample. QUIT just returns to the main screen.

The button on the left forms the most important part of RAP4 - the actual process of turning a real sound into a set of numbers that can be manipulated by computer. To demonstrate it, we will now record a sound.

RECORDING A SAMPLE

Standard Edition. Click on the RECORD button on the left of the screen. A window will appear at the base of the screen telling you to press the PLAY button on your datasette. Making sure that the tape is in the right place, do so. The screen will blank and remain so for around ten seconds. During this time, the sound on the cassette has been stored in RAM at the memory locations you selected from the Setup screen.

Deluxe Edition. Position the pointer on the RECORD button and press the PLAY button on your tape-recorder if you are using one. Immediately push the select button to activate the record option. The screen will blank and after around ten seconds the display will return to normal. The sound has now been stored in memory at the locations you specified on the Setup screen.

PLAYING-BACK A SAMPLE

To play back a sample all that is necessary is to click on the button marked PLAY-BACK. The screen will again blank and the sound will be played-back through your television or monitor speaker.

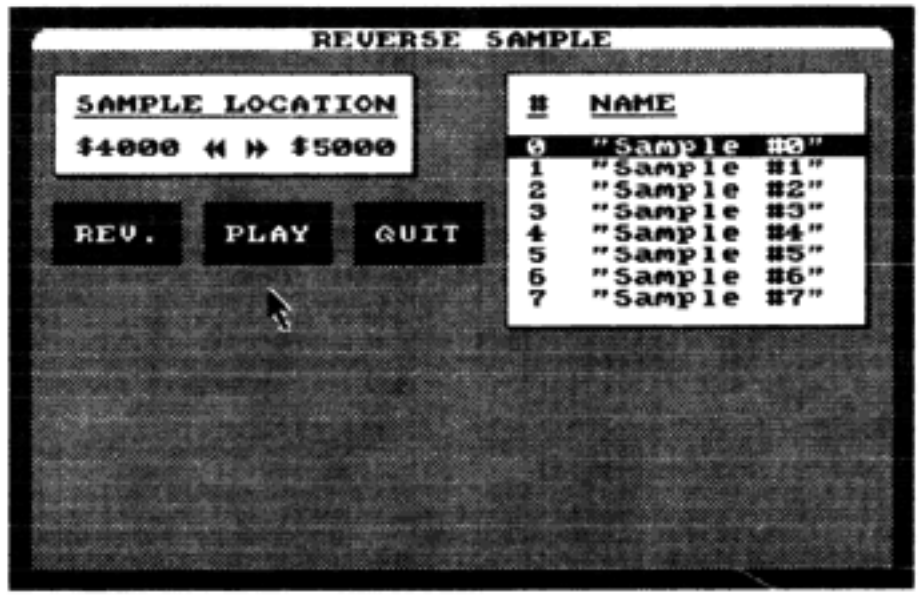
Experiment with different record and playback speeds until you have a good clear sound that you are happy with. Click on the REDEFINE button if you have changed the speed settings, and finally click on the QUIT button to return to the main menu.

The next topic I will discuss is that of editing your sound and creating special effects using it.

CHAPTER 4

REVERSING SAMPLES

If you have had experience of sound samplers other than RAP4, then you will have observed that most of them have a Reverse feature of some kind. On the majority of them, however, this option simply plays a sample backwards. On RAP4 the reverse function actually reverses each bit and byte of the sound. In this way, reversed sounds can be used in other parts of the RAP4 Editor such as the synthesizer and sequencer which I will discuss later. To activate the Reverse function, click on the SAMPLER menu and select the option marked REVERSE.



If all is well you should see the above screen. On the right is the usual sample information window, which in this screen is used for selecting the sample that you wish to reverse. Sample 0 should be highlighted, so leave it as it is.

In the top-left corner is the "Sample Location" window that is also present in the Sampler option. This just shows where the currently selected sample is positioned in memory.

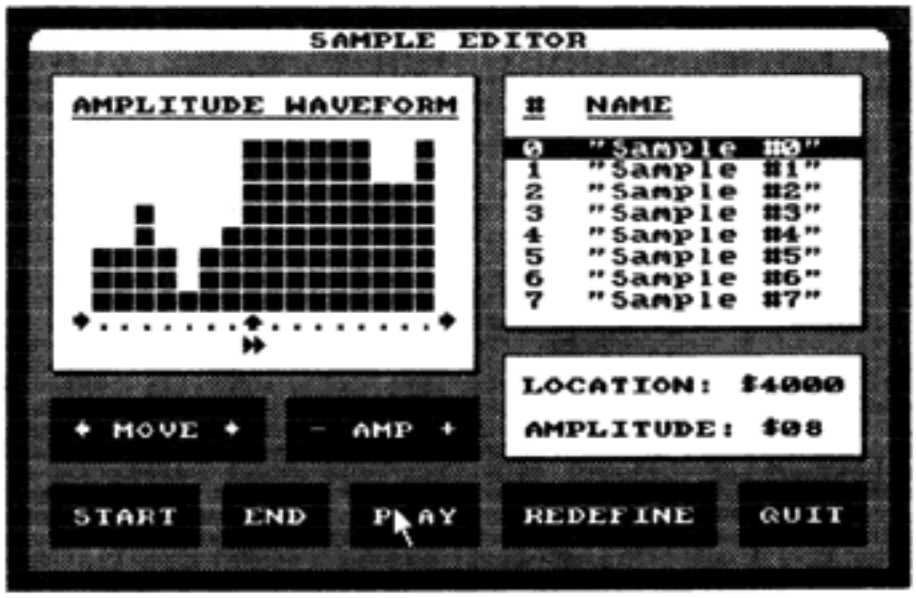
Below the Sample Location window are three buttons. Click on the PLAY button now - It just plays back the sample currently selected. Now click on the REV. (Reverse) button. A small window should appear beneath the row of buttons with the progress message "Reversing..." in it. After a second or so this will disappear and your sample will have been reversed. To listen to it, click on the PLAY button. If you click on the REVERSE button again the sample will be returned to normal.

You may be asking yourself what you can actually use the reverse facility for. Well, if you record the sound of a musical instrument, or for instance someone singing, then the attack of the note becomes the decay, and vice versa. In this way you can produce a wide variety of sounds from just one base note.

CHAPTER 5

THE SAMPLE EDITOR

RAP4's sample editor is arguably its most powerful facility, and one that is found very rarely on samplers for the 8-bit family of computers. After recording a sound as explained previously, select the editor by clicking on the EDITOR menu-header and selecting the EDITOR option. The display will be something like this:-



As you can see, this is a very full and complex screen. The graph display in the window marked AMPLITUDE WAVEFORM will of course be different depending on what sound you have recorded.
On the right is the Sample Information window. Try clicking on different samples to see the Waveform window change, then reselect Sample 0.

In the Waveform window, you can see that below the graph are two horizontal arrows, a double arrow, and a vertical arrow. These have the following meanings:-

The Vertical arrow. In the centre of the Waveform window is a vertical arrow. This displays the current byte of sample which is to be edited. The address that this arrow points at is also displayed in the window underneath the sample information window. Any changes you make will affect this byte only.

The Horizontal arrows. These arrows show the directions that you can move in. If you are at the beginning of the sample then both arrows will point right. If you are at the end, they will both be pointing left.

The Double arrow. At present, this arrow should be below the Edit pointer. It displays where the start of the sample if that location is visible on screen. If you are at the end of the sample, it will be displayed pointing to the left.

We now have an understanding of the different symbols within the Waveform window, so what does the actual graph show? It is labelled "Amplitude" as a convenient unit, but you may find it easier to think of it as "Density of the sound". The value of the byte above the edit pointer is shown as a number 0 to 8 in the window below the Sample information window. I'll now discuss the actual act of changing bytes within the sample, or cutting off unwanted parts of it.

The MOVE button. This button which is divided into two sections like buttons on the Speed and Setup screens, is used to move the Edit Pointer within a sample. As it moves, its position on-screen does not change, instead the Waveform window scrolls left and right.

The AMP (Amplitude) button. This button is used for increasing and decreasing the amplitude of a single byte within a sample. With a very short sample, just changing a single byte can alter the overall timbre of the sound.

The START button. This button is used to set the start location of a sample. Its main use is for cutting off unwanted parts of a sound. Quite often you may find a period of silence at the beginning of a sample which is the time it takes for the tape motor to engage. By using the START button you can cut this off.

The END button. This button works in the same way as the START button but is used to set the End location of the sample. Using these two you can very accurately select the section of sound you want to use.

Note that when using the START and END buttons, you can only make the sample shorter. To increase the size of a sample, or for more coarse, fast control, use the Setup screen. To return the start and end addresses to the values defined from the Setup screen, simply re-click on the sample in the Sample information window.

The PLAY button. When you have selected a section of the sample that you wish to listen to, clicking on the PLAY button will play it back for you. It uses the playback speed attached to the current sample by the Sampler screen, and the start and end addresses set by the START and END buttons.

The REDEFINE button. As with other of RAF4's screens, the changes you have made to the Start and End addresses will not be made permanemt until you click on the REDEFINE button.

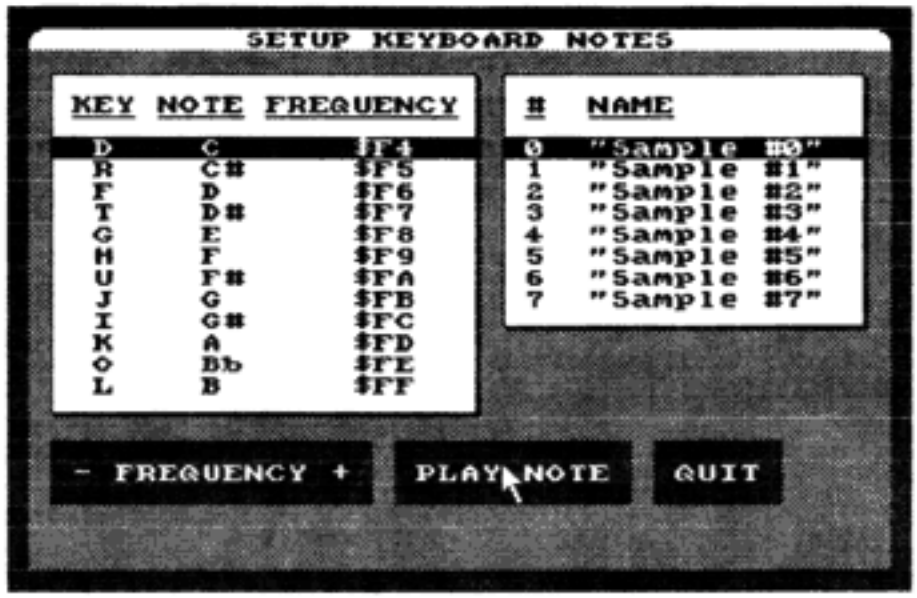
When you have produced a clean concise sample with no extraneous noise at the beginning or end, click on the QUIT button to return to the main screen.

CHAPTER 6

THE RAP4 SYNTHESIZER

SETTING UP THE SYNTHESIZER KEYBOARD

When you have recorded a sound, you can program a keyboard with different frequencies and then play the sound back on your Plus/4 keyboard as if it were a simple synthesizer. In this way you can build a complete musical instrument from just one note. Before playing the synthesizer you must set up the frequencies for each note. This is done by selecting the NOTE function from the SYNTH. menu-option. This results in the screen below.



On the right is the standard sample information window. A synthesizer definition only remembers frequencies - you cannot use a different sample for each key. Therefore you should select the sample you want to use on the synthesizer before starting.
On the left of the screen is a table showing (a) the key on the Plus/4 keyboard that will play that note. (b) the equivalent musical note which is used for displaying notes from within the sequencer, and (c) the frequency that is currently programmed into that key. You can select which key you want to play or alter by clicking on it's keyboard key, note or frequency in the keyboard information window on the left of the screen.

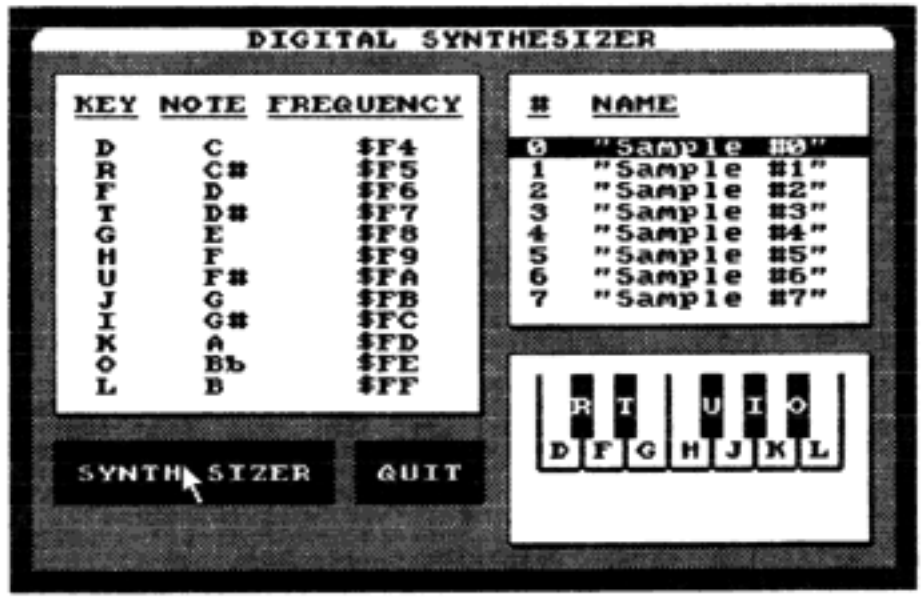
The FREQUENCY button. Using this button you can increase or decrease the frequency programmed into the key highlighted in the keyboard information window. These frequencies are equivalent to the playback speed settings in the Sampler screen, and are in the range $00-$FF hex.

The PLAY NOTE button. When you have selected a frequency for a key, you can play that note as if you were hitting the key on the keyboard. This is done by clicking on the PLAY NOTE button.

SETTING UP THE SYNTHESIZER KEYBOARD (Cont.)

When you have setup each key to frequencies which roughly correspond to the notes of an octave on a piano keyboard, or to a totally different progression if you like, click on the QUIT button to return to the main screen. Now you're ready to actually start "composing".

PLAYING THE SYNTHESIZER



The synthesizer is activated by selecting the SYNTH. menu-option and choosing the SYNTH. funtion on the pull-down menu. The screen will change to the one shown above which is similar to the NOTES option screen. At the top are the keyboard information window and the sample information window. The keyboard information window is just to remind you what the current keyboard setup is. To choose which sample you want to play on the keyboard, click on it in the sample information window.

On the left are two buttons. The QUIT button has its normal function, and the SYNTHESIZER button is to activate the synthesizer allowing you to play the keyboard. On the right is a diagram of the keyboard showing which keys generate which note. To start playing, click on the SYNTHESIZER button.

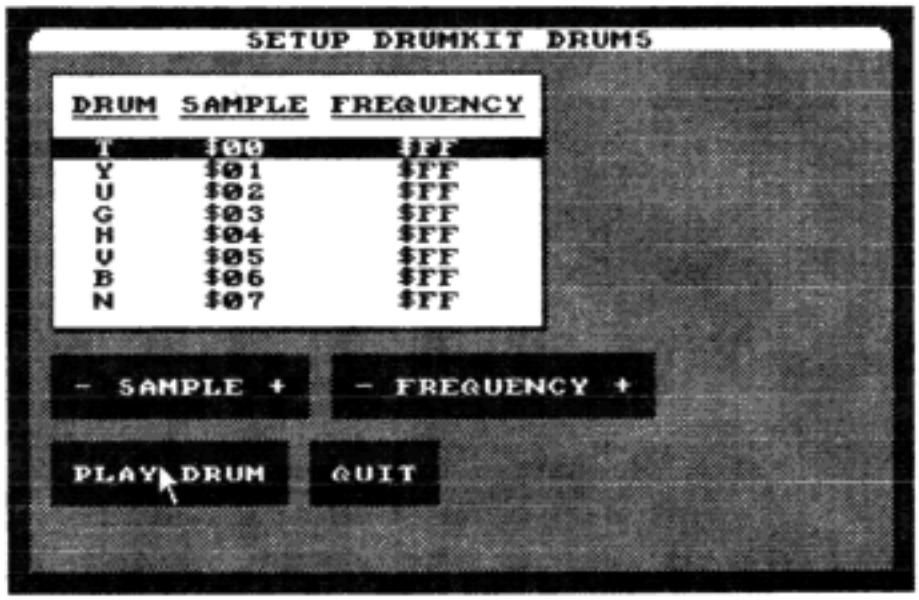
In the keyboard diagram a message should appear "ESC" TO STOP. You can now press the keys indicated on the diagram to play each of the notes, and holding a key down will make that note repeat. You may find that the sample you have recorded is a bit long and unwieldy for playing on the synthesizer. If so, press ESC (In the top left corner of the Plus/4 keyboard), QUIT the synthesizer, and alter the sample using the Editor and Setup screens. When you have finished playing on the synthesizer, press ESC and click on QUIT to get back to the main screen.

CHAPTER 7

THE RAP4 DRUMKIT

SETTING UP THE DRUMKIT

The Drumkit facility in RAP4 is similar to the Synthesizer, except that whereas in the Synthesizer you can only program a frequency into each Key, on the drumkit you can program a different sample AND frequency into each key. There are eight drums instead of the twelve notes available on the synthesizer. To set these up, select the DRUMS function from the SYNTH. menu-option.



As you can see, the screen display is quite similar to the Notes screen. The drum information window on the left shows the key on which each drum is played, the sample that is programmed into that drum, and its frequency. The sample information window is not present as each drum has its own sample attached to it. To select which drum you wish to program, click on its information in the drum information window and it will become highlighted.

The SAMPLE button. Using this button you can change which sample is programmed into the selected drum. Decreasing or increasing the sample number is performed by clicking on the relevant side of the button.

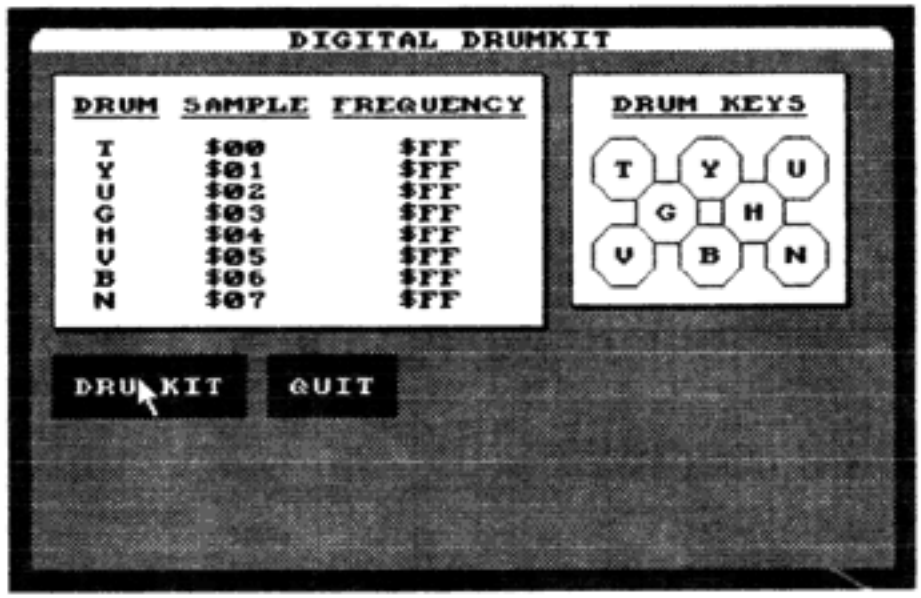
The FREQUENCY button. This button works in the same way as the FREQUENCY button on the Notes screen and is used to change the frequency of the sample to be played on the selected drum.

The PLAY DRUM button. When you have set-up a drum, you can preview how it will sound by clicking on the PLAY DRUM button.

When you are satisfied with your drumkit, click on the QUIT button to return to the main screen. You are now ready to use the drumkit.

PLAYING THE DRUMKIT

You should now have a working drumkit setup using the Drums screen. To begin playing rhythms on it, select the DRUMKIT function from the SYNTH. menu-option. The screen will change to the one shown below.



In the top-left corner you can see the Drum information window to remind you of the values set-up for each drum, and next to this is a diagram showing you wish keys to use for each drum.

Below these are two buttons. The one on the left of the screen marked DRUMKIT activates the drumkit allowing you to start playing the drums. Click on this button now.

Having clicked on the DRUMKIT button, a window will appear below the drumkit diagram telling you to PRESS "ESC" TO STOP. At this point you can play any of the drums by pressing the keys marked on the drumkit diagram. You can repeat the drums by holding down the key. When you are ready to stop, or you wish to change the drum definitions, press the ESC key on your Plus/4, and click on the QUIT button to return to the main screen.

It is a good idea when using the drumkit to define two or three drums as a very short sample (say 20 or 30 bytes) with each drum at different frequencies. In this way you can get a good range of snare drums and cymbals by holding down keys making the drums repeat very rapidly. By keeping drum samples short you can play a wide number of rhythms using the same drumkit setup.

CHAPTER 8

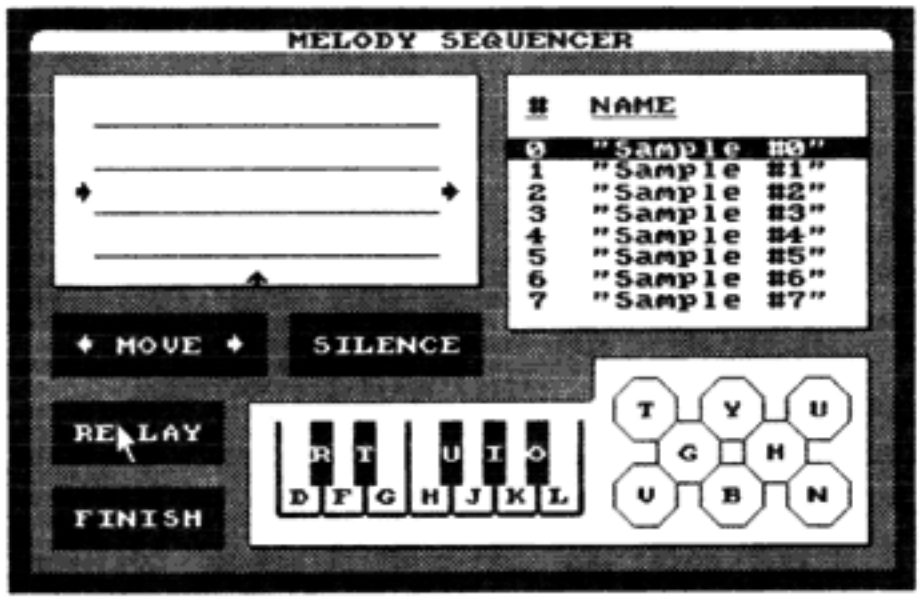
THE MELODY SEQUENCER

SETTING UP THE SEQUENCER

Any melodies produced using the RAP4 Melody Sequencer are made up out of Notes and Drums forming part of the synthesizer and drumkit. If you pull-down the SEQUENCER menu you will see that the first two options are NOTES and DRUMS. These are duplicates of the same functions in the SYNTH. menu. For instructions on using them, see the instructions in the synthesizer and drumkit sections.

COMPOSING A MELODY

The melody sequencer is activated by choosing the EDITOR function from the SEQUENCER menu-option. On selecting this facility, the screen will be as shown below.



This screen is another complicated one - In the top-right corner you can see the normal sample information window. This is used to select which sample the sequencer will use for playing synthesizer notes and is operated in the standard way.

Next to the sample information window is a window which displays a section of 16 notes of the current melody. At start-up, nothing should be displayed. On the left and right you can see the two horizontal arrows which work in the same way as in the sample editor, but indicating the start and end of the melody. Also similar is the note pointer in the middle of the window which shows the current note.

COMPOSING A MELODY (Cont.)

In the bottom-right corner of the screen is a console that is made up out of both Synthesizer and Drumkit. It is from here that you actually add notes to a melody. Try it now by pointing at drums or notes. As you select a note or drum the corresponding sound will be made and a character will appear in the melody window shown in the top-left of the screen. Each time you add a note the window will scroll left.

Now that you have entered several notes and drums we will talk about how they are displayed in the melody window. As you can see there are four lines which are standard musical "staves". Notes are displayed on these as black circles. If the note you enter is a sharp or flat (black key) then it is displayed as the natural note (white key) below it with a sharp sign (#) in the black circle. This should all become clear with time if you haven't had experience of sheet music.

Drums are shown on the same set of staves, this time as a "checkerboard" or grey circle. The drums are arranged with drum "T" above the top stave and drum "N" on the lowest stave, progressing downwards.

There are obviously going to be places in your tune where you want a period of silence, for creating rhythms or producing "rests" in a tune. To insert such a silent period, click on the button above the main console marked SILENCE. This appears in the melody window as a set of blank staves. The silence lasts for approximately the same time as a 256-byte sample played at full speed, and should be short enough for all applications. Long notes, drums or silences can be produced by repeating them - When they are played back they will merge together.

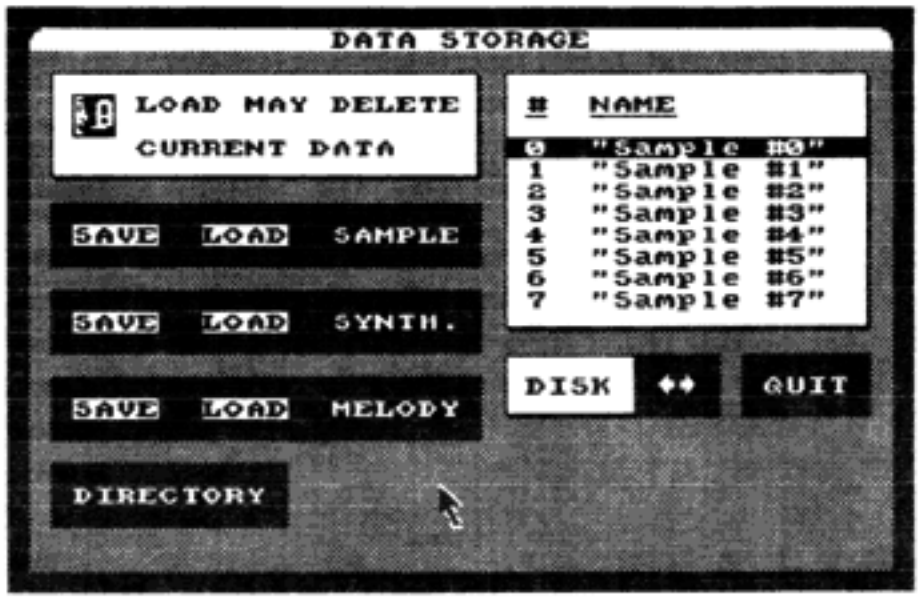
Enter a few more notes and drums, and then we'll see what it sounds like. To do this click on the button marked REPLAY. It is very unlikely that your musical masterpiece will be perfect first time, so this is where the MOVE button comes in. You can move forwards or backwards through a tune, playing it as you go, by clicking on the left or right side of the MOVE button. When you find an incorrect note simply move the note pointer onto it and enter the correct note using the console at the base of the screen. Note that when moving the note pointer, each sound is played as you move OFF that note onto the next or previous position. When entering notes the note pointer automatically advances itself to the next note. If you attempt to exceed the maximum 128 notes the pointer will remain on the last note which can be played by clicking on MOVE right.

When you are satisfied that your melody is perfect, or as good as you are going to get it, click on the FINISH button to return to the main screen. The next subject we will discuss is storing your work on a disk or cassette.

CHAPTER 9

SAVING YOUR WORK

In this chapter you will learn how your store your samples, synthesizer setups, or melodies on a tape or disk so that you can use them later in your own programs. All loading and saving is performed from the Storage screen which can be selected by choosing STORAGE from the SYSTEM menu.



On selecting the STORAGE option, the above screen will be displayed. In the top-left is an important warning that if you load any data, it will erase the data that was there previously. On the right is the sample information window which is used to select which sample you wish to save. To the left of this window are the actual SAVE and LOAD buttons, and below the sample information window is a window-button combination for selecting tape or disk, and the QUIT button. The final button is the DIRECTORY button in the bottom-left corner of the screen which is of interest to those using disk-drives.

SELECTING THE FILING DEVICE

When you first enter the Storage screen you will see that in the window next to the quit button, is a window showing the word DISK. If you are using a datasette for storing programs, then you can select this by clicking on the toggle button next to the quit button. Saving and loading on RAP4 takes full advantage of the disk-drive and datasette, operating in two distinctly different ways. For this reason the next sections are divided into two - for tape users and for disk users.

Deluxe Edition Users. Remember that before using a disk-drive or printer, you must disable your TTL4 interface. Do this now by rotating the INPUT LEVEL control fully left.

SAVING A SAMPLE

Tape Users. I have mentioned before that RAP4 uses a very fast tape system running at 2340 baud (bits per second). Therefore the RAP4 editor has a sophisticated tape filing system, making loading and saving data simplicity itself. Place a blank tape in your datasette now. To save a sample, first of all click on its name in the sample information window, then click on the SAVE button (black on white) in the SAVE/LOAD SAMPLE section on the left of the screen. A window will appear at the base of the screen telling you to "Wind tape then press stop". You can now position the tape in your datasette using the Rewind and Fast Forward buttons until you reach the place where you want to save your sample. Do this and press the STOP button on your Datasette.
The window will change telling you to press the RECORD button on your datasette. When you do this the window will display the message "Saving...". After a short pause, your sample will be saved. While this is happening the screen will show a pattern of blue and white stripes. When the saving is complete the screen display will return to normal.

Disk Users. Comprehensive facilities have been included in the RAP4 editor to make disk-drive use as easy as possible. Before starting, place a disk in your disk-drive. You cannot use the RAP4 system disk as it has been protected to stop you damaging the program.

First, we will examine what is on your disk. To do this, click on the DIRECTORY button below the main three SAVE and LOAD buttons. The screen will clear to a large window with two buttons next to it, and the disk contents will be displayed in the window. While the directory is being displayed you can halt it by pressing the CTRL-S keys. To continue the display press any other key. You can also slow down the scrolling by pressing the CBM key (bottom-left of keyboard).

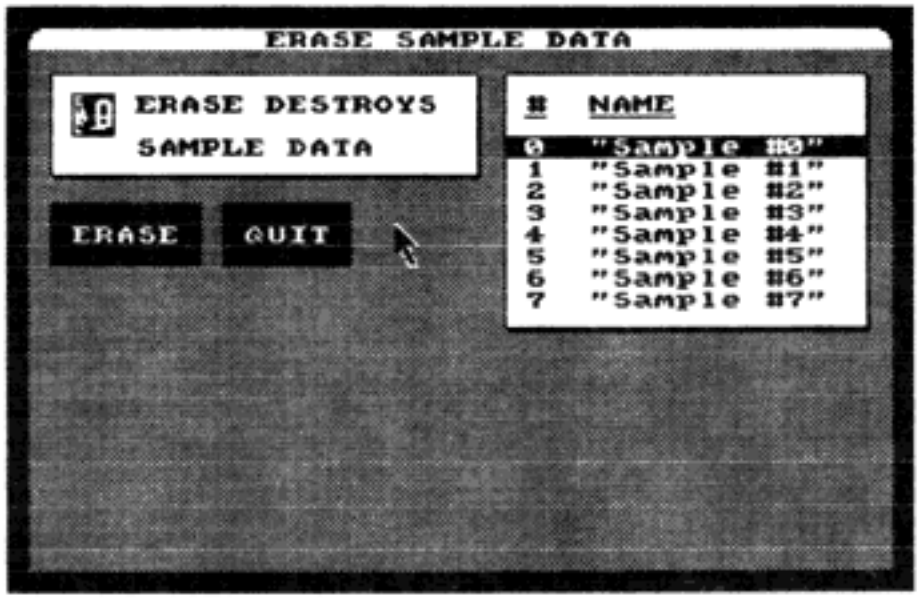
If you have the wrong disk in your disk-drive, you can exchange it and view the directory by clicking on the REPEAT button. To return to the main Storage screen, click on the RETURN button.

We are now ready to save a sample - Select the one that you wish to save by pointing at its name in the sample information window, then click on the SAVE button (black on white) in the SAVE/LOAD SAMPLE section. A window will appear at the base of the screen with the message "Saving..." in it and after several seconds the screen will return to normal. You can check that the sample has been saved by going back to the Directory screen by clicking on the button marked DIRECTORY.

At this point you should have a sample saved on tape or disk. Now, we will load it back to demonstrate the LOAD function. First, though we'll discuss the ERASE function of RAP4 which is for erasing samples.

ERASING A SAMPLE

At this point we will try to load back the sample you have just saved. In order to test that it has been saved properly, we will first erase that sample from memory. This is done by returning to the main screen (Click on QUIT) and choosing the ERASE function from the EDITOR menu-option. On doing this the screen will change to the one below.



In the top-right corner is a warning message to the tunes that once you have erased a sample, there is NO way you can get it back. On the right is the sample information window used to select which sample you wish to erase, and under the warning window are two buttons marked ERASE and QUIT. We want to erase your sample so select it on the sample information window and click on the ERASE button.

A small window should appear below the two buttons showing the message "Erasing..." and after a few seconds disappear. Your sample has now been wiped from memory. Click on the QUIT button and go back into the Storage screen ready to attempt to reload your precious sample.

RELOADING A SAMPLE

Tape Users. Loading data using RAP4 is designed to be as simple as possible and makes full use of the motor control ability of the Plus/4. To reload your sample click on the LOAD button in the SAVE/LOAD SAMPLE section.

A window will be displayed at the base of the screen telling you to press the PLAY button on your datasette. You can now rewind the tape, then press the PLAY button as it asks. The message in the window will change to "Searching...". When RAP4 finds a file on the tape the message will change to FOUND SAMPLE/SYNTH./MELODY "Filename". If the file is a sample then the FOUND will be replaced by "LOAD?" and two more buttons will appear marked "YES" and "NO". If you do not want to load the sample displayed, click on the NO button to try the next file, or QUIT to abort the load. If you DO want to load this sample then click on the YES button. The window will change to "Loading..." and the sample will load. Check that it has loaded properly by returning to the SAMPLER option and clicking on PLAY-BACK.

Disk Users. To reload your sample, click on the LOAD button in the LOAD/SAVE SAMPLE section. A window will appear with the entry prompt "FILE-NAME:" in it and an I-Bar. Type in the name of the sample you wish to load and press RETURN. The window will display the message "Searching..." and after a short pause change to "Loading...". If all is well, after several seconds the window will disappear and the screen display will return to normal. If an error has occured while loading such as there not being a disk in the drive, or you typing in the file-name incorrectly, then a warning window will be displayed showing an error message. This message will either be of the form "NN, ERROR MESSAGE,NN,NN" or it will say "OPERATING SYSTEM ERROR $NN". The former are Disk-drive errors. Their full meanings can be found in Appendix A. The latter are system errors and their meanings can be found in Appendix B. The final possible error is "ILLEGAL FILE TYPE" which occurs when for instance you try to load a synthesizer file as if it were a sample.

When an error message is displayed, it will be accompanied by an extra button marked "OK". To acknowledge the error click on either OK or QUIT to return to the Storage screen.

If no error has occured, your sample will now have been reloaded. To check this, return to the SAMPLER option and click on the PLAY-BACK button.

SAVING & LOADING A SYNTHESIZER SETUP

We have already discussed saving and reloading samples to and from tape and disk. There may be times when you want to store the current syntheszier and drumkit setups for use in your own programs or at a later date. This process is exactly the same as for saving a sample, except that when saving samples the file is automatically given a file-name the same as the sample name. When saving a synthesizer setup you are prompted to enter a filename, and then the saving and loading processes are identical to those for loading samples. The saving and loading are activated by clicking on the SAVE or LOAD buttons in the SAVE/LOAD SYNTH. section.

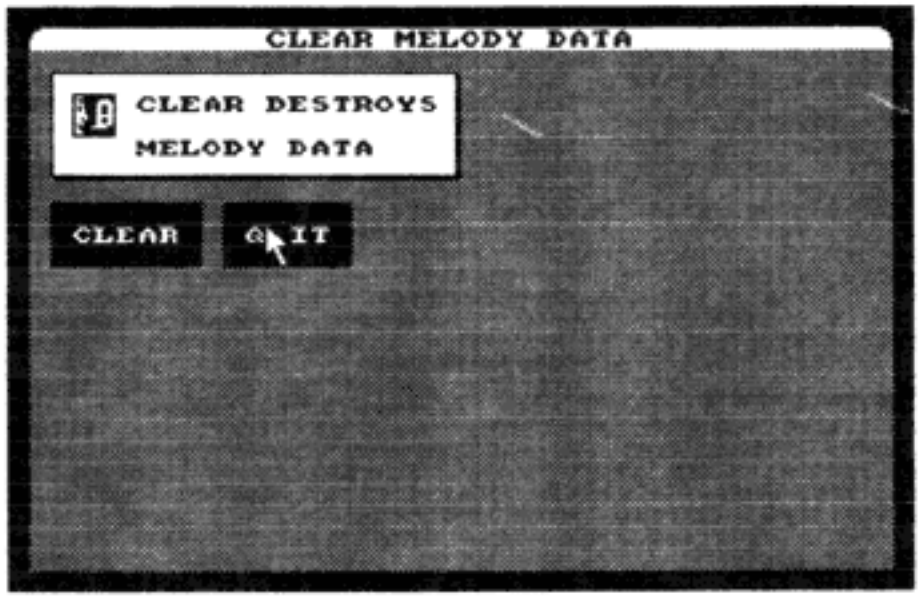
SAVING A MELODY

The action of saving a melody programmed using the RAP4 sequencer is identical to that of saving a synthesizer setup. To demonstrate this click on the SAVE button in the SAVE/LOAD MELODY section and follow the instructions as for saving a synthesizer and sample.

To check that the melody has been saved properly, we will first clear it in the same way that we ERASEd a sample. This is explained in the next section overleaf.

CLEARING A MELODY

You should have already entered a short melody to test the Sequencer facility of RAP4, and saved it onto tape or disk. We will now clear this melody to verify that it has been saved properly. This is done by choosing the CLEAR function from the SEQUENCER menu-option.



As you can see, in the top-left corner is a warning message, and below it are two buttons marked CLEAR and QUIT. To clear the current melody click on the CLEAR button. Clearing is almost instantaneous so no progress window is displayed. When you have done this, just click on the QUIT button, and return to the storage menu.

RELOADING A MELODY

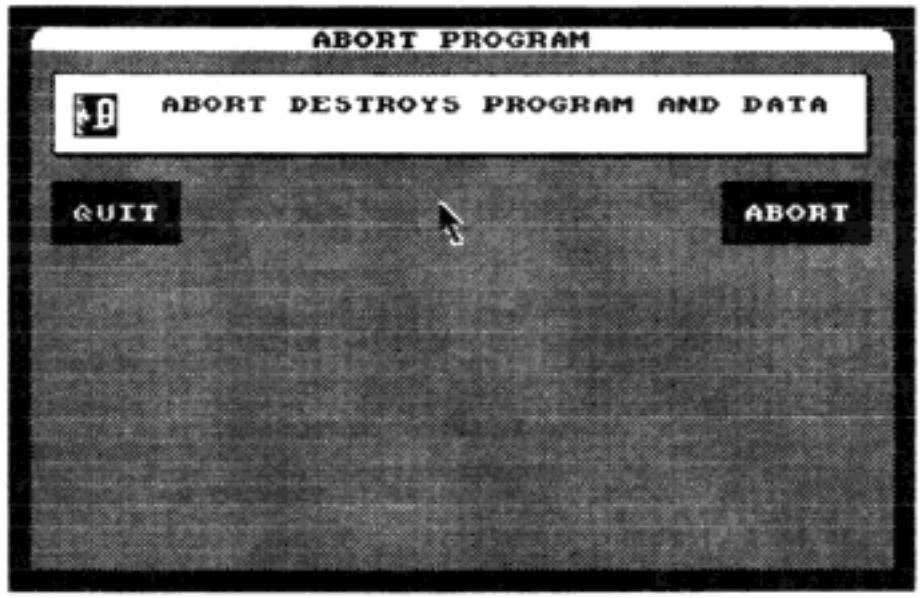
You should now have a melody saved on tape or disk, and a melody area clear of any data. To reload the melody click on the LOAD button on the SAVE/LOAD MELODY section. Reloading a melody is done in exactly the same way as reloading a synthesizer setup. Load your melody back into memory again and check that this has been done by going into the Sequence Editor screen and clicking on REPLAY.

That just about completes our tour of the RAP4 Editor's individual functions in all their glory. To finish I will explain how to exit the Editor and how to recover yourself from any mistakes you may make while using the program.

CHAPTER 10

LEAVING THE RAP4 EDITOR

When you have completed any work you have been doing on the RAP4 Editor, you can exit to BASIC through the ABORT option. To select it choose the ABORT function from the SYSTEM menu-option. This results in the screen below being displayed.



At the top of the screen is an important message warning you not to abort the program unless you are absolutely sure about doing so. Below this are two buttons which have been placed far apart so that you cannot accidentally select one.

If you have saved all the data you want to, as explained in the previous chapters, click on the ABORT option on the left. This performs a cold reset, as if you had pushed the Reset button on the side of the computer and leaves you in good old Commodore BASIC. If you are not sure that you want to abort the program, then clicking on the QUIT button returns you to the main screen.

CHAPTER 11

RECOVERING FROM MISTAKES

It is inevitable that at some time while using the RAP4 editor, you will do something you didn't mean to do. Examples of this are playing a full memory sample at a playback speed of zero which results in five minutes and three seconds of boredom, or trying to load a cassette file that doesn't exist. You can however easily recover from all these situations leaving your data intact. This is done in the following way:-

While holding down the RUN/STOP key, push the Reset button, which is on the right-hand side of your Plus/4. This as usual puts you into the machine-code monitor TEDMON. To get back into RAP4, simply press the HELP button (Right-most function key). This returns you to the main screen leaving all your sample data etc. unchanged.

And that brings us to the end of our discussion of the RAP4 editor. The second half of the manual is devoted to RAP4 BASIC. For easy use there is a summary of each of the RAP4 Editor's functions in the Quick Reference section at the end of this manual

CHAPTER 12

INTRODUCING RAP4 BASIC

So that you can use the sounds and tunes you have created using the RAP4 editor in your own programs, a special extension to the normal Plus/4 BASIC has been included in the RAP4 package. The system has been written in accordance with the design of the RAP4 Editor making it easier to use than the usual BASIC as all of the commands take a syntax very close to normal written English. To begin, however, you must load the program. If you have the Deluxe edition of RAP4 follow the Disk User instructions.

LOADING RAP4 BASIC

Tape Users. Place the RAP4 cassette in your datasette and rewind fully on side 2. Type LOAD and press RETURN followed by the PLAY button on your datasette. After a few seconds the screen will display RAP4 BASIC in the top-left corner. Press the Commodore key (bottom-left of keyboard). The loading process is identical to that of loading the RAP4 Editor but on the title screen the word EDITOR is replaced with BASIC. The program takes approximately 54 seconds to load.

Disk Users. Put the RAP4 system disk in your disk-drive. Deluxe Edition users don't forget to disable your TTL4 interface if it is plugged-in. Press the RUN/STOP key while holding down the SHIFT key and press "2" when greeted with the RAP4 menu. After a few seconds the program will have loaded.

If the RAP4 BASIC program has loaded properly the screen should clear and a startup message will be displayed.

The top two lines are obviously just a copyright message, but what about the "HELP AVAILABLE" bit? Well, to help you when you're first learning RAP4 BASIC, a special HELP function has been included which can be used to display help on any of the RAP4 commands. These commands are LOAD,SOUND,DEFAULT and LIST. True, they don't look very impressive but each can be used in a number of ways giving a complete range of operations from a very small number of commands. So that you can remember the names of each command, they have been setup as normal BASIC words with extended syntax to give the new functions. In the next few chapters I'll discuss the use of each of the commands.

If you have not already done so, now is a good time to save onto a tape or disk a sample, synthesizer setup and a melody as we will use each of these to examine the RAP4 commands.

CHAPTER 13

LOADING RAP4 DATA

The whole point of RAP4 BASIC is so that you can use sounds created on the RAP4 Editor in your own programs so the first subject I will discuss is that of loading data saved from the RAP4 Editor. The command for performing this is LOAD and as with all RAP4 commands, it is used in a slightly different way in the direct mode than in programs. When using any RAP4 commands in direct mode it is necessary to precede them with a colon so LOAD (in a program) becomes :LOAD in direct mode. Note that commands must also be preceded with a colon after a THEN or ELSE statement. The syntax for LOAD is shown below.

:LOAD [SAMPLE/SYNTH/MELODY] "FILE-NAME." (USING [TAPE/DISK])

First let's make clear the punctuation used: When there are a pair of square brackets, you must type ONE of the phrases within the brackets. Terms within round brackets are optional and need not be included. Note that you never type the brackets but you SHOULD type inverted commas.

The first word is the actual command: LOAD, and the rest are its "Arguments", the first being either SAMPLE, SYNTH or MELODY. This refers to the type of file you wish to load - If you want to load a sample then you type :LOAD SAMPLE... or if you want to load a synthesizer setup then you type :LOAD SYNTH...

After the file-type comes the file-name. This is the name that you saved the data under from the RAP4 Editor and can be up to 10 characters long. Always enclose the name in inverted commas (SHIFT-2 on the keyboard).

Following the file-name is the word USING followed by either TAPE or DISK. If you leave out this section, then RAP4 will assume that you are using the device that you used last for loading. Thus if you load a sample using :LOAD SAMPLE "FILE-NAME" USING TAPE then all subsequent load operations will use the datasette if no USING phrase is included. If you subsequently want to use the disk-drive type :LOAD SAMPLE "FILE-NAME" USING DISK. When you first load RAP4 BASIC, the system assumes that you are using a disk-drive for data storage. Also note that RAP4 is not fussy about whether or not you insert spaces - If you put 20 in, or none at all it will still work.

Another thing to mention about all the RAP4 commands is that you can replace numbers and strings with real (N) or integer (N%) variables and string (N$) variables. In the same way you can use any BASIC expressions that evaluate to a valid argument for example "FILE-NAME", (F$) and STR$(10) are all valid file-names.

The other important thing to mention about the USING phrase is that to make the system as friendly as possible you can use either USING TAPE/DISK, FROM TAPE/DISK, or ON TAPE/DISK. All have the same meaning to RAP4. Another point to mention is that when using the datasette typing :LOAD SAMPLE "" means "Load the next sample file you find on this tape" NOT "Try and load the next file as if it were a sample". Also, when loading samples, RAP4 automatically moves the top limit of RAM down so that your program cannot accidentally corrupt the sample data. This process involves clearing all the program variables so all your LOAD commands should appear at the beginning of the program. It is also worth mentioning that the normal BASIC commands LOAD, SOUND etc. operate in the normal way with no alteration - RAP4 detects whether the command you have entered is the normal BASIC command or the RAP4 BASIC command. Additionally, to save typing you can use the abbreviations which can be found in appendix D at the end of this manual.

EXAMPLES OF *LOAD* IN USE

:LOAD SAMPLE "SAMPLENAME" FROM DISK

:LOAD SYNTH "SYNTH.NAME" USING TAPE

10 LOAD MELODY "MELODYNAME"

10 INPUT F$:LOAD SAMPLE (F$) FROM DISK

TAPE & DISK LOADING PROCEDURE

Tape Users. When you enter a LOAD command, if you have not pressed the PLAY button on your datasette, the message "Press play on tape" appears. When you press the PLAY button the message "Searching..." is printed. When the computer finds a file it displays the message "Found TYPE "FILE-NAME"" where TYPE is the file-type and FILE-NAME is the file-name. If the file-name and type match the ones you entered, the computer will display the message "Loading..." and load the file. If not, the message "Searching.." will be redisplayed and the process repeated until a valid file is found.

Disk Users. When you enter a LOAD command, the disk-drive will begin to whirr and the computer will search for the file-name you have specified. If it finds the file and it is of the type you have specified, then the message "Loading..." is displayed and the file is loaded. If an error occurs then the error message "?FILE DATA ERROR" is displayed and any program running will stop, leaving you in direct mode. The disk error can be read using the standard disk variables DS and DS$. If no disk error has occured this indicates that the file exists but is of a different type to the one specified.

LOAD **ERROR MESSAGES**

?SYNTAX ERROR. You have used a word or phrase that the RAP4 BASIC interpreter does not understand, or have ommited an argument.

?MISSING FILE NAME ERROR. You have left out the file-name.

?STRING TOO LONG ERROR. The file-name you have entered is longer than ten characters.

?TYPE MISMATCH ERROR. You have not enclosed the file-name in inverted commas.

?ILLEGAL DEVICE NUMBER. Instead of TAPE or DISK you have entered one of the two SCREEN or PRINTER.

?FILE DATA ERROR. For information see disk section above.

Note that all error messages can be detected using the BASIC TRAP command and can be identified using the variable ER in the normal way.

CHAPTER 14

PLAYING SOUNDS

You should now fully understand the operation of the LOAD command. Now load the sample, synthesizer setup and melody that you saved using the RAP4 Editor. In this chapter you'll learn how to playback samples, the synthesizer and melodies from within your own program. The command to do this is SOUND and as with the LOAD command it needs to be preceded with a colon in the circumstances I have already mentioned. The syntax for the SOUND command is shown below.

```
:SOUND SAMPLE SMP#  (USING [SPEED SPD#])
       NOTE   "KEY" (USING [SAMPLE SMP#])
       DRUM   "KEY"
       MELODY   -   (USING [SAMPLE SMP#])
```

As you can see the SOUND command has a wide range of syntax for playing every type of sound you can produce using RAP4. We'll concentrate on each of these variations in the next few sections.

PLAYING SAMPLES

The syntax of the SOUND command when used to play samples is shown below.

:SOUND SMP# (USING [SPEED SPD#])

The command takes one argument and another optional one. The first SMP# is the sample number which is in the range 0-7. The second USING SPEED SPD# is the speed at which you wish the sample to be played back. If you leave the USING argument out then the sample is played back at the speed attached to that sample using the RAP4 Editor. When a sample is played, as in the RAP4 Editor, the screen is blanked, and when using RAP4 BASIC it turns the colour of the border at that time.

EXAMPLES OF *SOUND SAMPLE* IN USE

```
:SOUND SAMPLE 4

:SOUND SAMPLE 1 USING SPEED 100

:SOUND SAMPLE 2 USING SPEED (S%)

10 FOR N=250 TO 255:SOUND SAMPLE 7 USING SPEED (N):NEXT N
```

SOUND SAMPLE ERROR MESSAGES

?SYNTAX ERROR. You have either used a word that the RAP4 BASIC interpreter does not understand, or have omitted an argument.

?ILLEGAL QUANTITY ERROR. Either the sample number you have specified is beyond the range 0-7 or the speed number is beyond the range 0-255.

?TYPE MISMATCH ERROR. You have mistakenly replaced a numeric argument with a string.

SETTING UP THE DEFAULT SAMPLE

If you examine the SOUND NOTE and SOUND MELODY syntax shown two pages previously you will see that the final optional argument is USING SAMPLE SMP#. If this argument is left out, then the Default sample is used. To define this default sample, the command used is DEFAULT. The syntax for this command is shown below.

:DEFAULT SAMPLE SMP#

As you can see, the command only takes one argument - the sample number which is in the range 0-7. You must also include the SAMPLE phrase. Once this command has been executed all commands with no sample specified will use SMP# as the sample number.

EXAMPLES OF *DEFAULT SAMPLE* IN USE

:DEFAULT SAMPLE 6

:DEFAULT SAMPLE (N%)

10 INPUT S:DEFAULT SAMPLE (S)

DEFAULT SAMPLE ERROR MESSAGES

?SYNTAX ERROR. You have either typed a word that the RAP4 B ASIC interpreter does not understand, or you have omitted the SMP# argument.

?ILLEGAL QUANTITY ERROR. The sample number you have specified is beyond the range 0-7.

?TYPE MISMATCH ERROR. You have mistakenly entered a string in place of the sample number.

PLAYING SYNTHESIZER NOTES

If you have not already loaded a synthesizer setup from tape or disk then do so now. We'll now discuss how to play any of the notes that would be played from the synthesizer keyboard in the RAP4 Editor. The syntax of the SOUND command for doing this is shown below.

SOUND NOTE "KEY" (USING [SAMPLE SMP#])

The first argument KEY refers to the key one presses from the synthesizer in the RAP4 Editor to produce the note you require. This should be one of D,R,F,T,G,H,U,J,I,K,O,L. The USING SAMPLE phrase is optional and if omitted the default sample is used. If you do include it the sample number should be in the range 0-7. Note that you can also replace the USING with the word ON if you find that easier to remember.

EXAMPLES OF *SOUND NOTE* IN USE

```
:SOUND NOTE "R" ON SAMPLE 4

A$="L":SOUND NOTE (A$)

10 INPUT N$:SOUND NOTE (N$)

10 FOR N=1 TO 12:SOUND NOTE (MID$("DRFTGHUJIKOL"):NEXT
```

SOUND NOTE ERROR MESSAGES

?SYNTAX ERROR. You have either entered a word that the RAP4 BASIC interpreter does not understand, or have omitted one of possible arguments.

?UNDEF'D FUNCTION ERROR. The KEY you have specified is not one of the keys used for playing synthesizer notes.

?TYPE MISMATCH ERROR. You have entered a number in place of the key, or a string in place of the sample number.

?ILLEGAL QUANTITY ERROR. You have entered a sample number which is beyond the range 0-7.

PLAYING SYNTHESIZER DRUMS

The syntax of the SOUND command is similar to that for playing synthesizer drums but because each drum is programmed with both frequency and sample, you don't specify a sample number.

```
SOUND DRUM "KEY"
```

The first argument KEY refers to the key one presses from the drumkit in the RAP4 Editor to produce the drum you require. This should be one of T,Y,U,G,H,V,B,N

EXAMPLES OF *SOUND DRUM* IN USE

```
:SOUND DRUM "Y"

D$="B":SOUND NOTE (D$)

10 GETKEY K$:SOUND NOTE (K$)

10 FOR N=1 TO 8:SOUND NOTE (MID$("TYUGHVBN"):NEXT
```

SOUND DRUM ERROR MESSAGES

?SYNTAX ERROR. You have either entered a word that the RAP4 BASIC interpreter does not understand, or have omitted the key argument.

?UNDEF'D FUNCTION ERROR. The KEY you have specified is not one of the keys used for playing drumkit drums.

?TYPE MISMATCH ERROR. You have entered a number in place of the key.

PLAYING A MELODY

Once you have mastered playing notes and drums, the next logical step is playing melodies. This function is also performed using the SOUND command and the syntax for this use is as follows.

:SOUND MELODY (USING [SAMPLE SMP#])

In its most simple form the command takes no arguments, just the MELODY phrase. If no sample number is specified then the default sample is used as I have explained before. Alternatively a USING clause can be supplied with a sample number in the range 0-7 and if you like the USING can be replaced with ON.

EXAMPLES OF *SOUND MELODY* IN USE

:SOUND MELODY ON SAMPLE 5

:SOUND MELODY

10 N=2:SOUND MELODY ON SAMPLE (N)

SOUND MELODY ERROR MESSAGES

?SYNTAX ERROR. You have entered a word that the RAP4 BASIC interpreter does not understand, or have omitted the sample number from the USING clause.

?ILLEGAL QUANTITY ERROR. The sample number you have specified is beyond the range 0-7.

?TYPE MISMATCH ERROR. You have mistakenly entered a string instead of the sample number.

That completes our discussion of the commands for loading and playing sound created using the RAP4 Editor. The next chapters cover the two commands to help you when writing programs in RAP4 BASIC.

CHAPTER 15

LISTING RAP4 DATA

At times when writing programs using RAP4 BASIC, you may forget which samples you have in memory, or want information about what values are setup on the synthesizer etc. For this purpose a powerful command has been included to display any information that you might need to know. The command for doing this is LIST and its syntax is show below.

:LIST INFO (USING [SCREEN/PRINTER])

This command uses two new devices - the SCREEN or PRINTER and you can choose which you want the data to be printed on. USING can also be replaced with ON or TO in this instance. Listing on the printer is useful for when you want to keep a hard-copy of the information. Any Commodore compatible printer such as the MPS803, Citizen 120D or STAR NL10 can be used. If the USING clause is omitted the screen is assumed.

You can see that the screen is divided into two sections top and bottom. At the top are seven headings labelled #, SAMPLE NAME, START, END, REC and PLAY. # refers to number of the sample displayed on that line. SAMPLE NAME is the name of that sample. START is the sample's start address. END is the sample's end address. REC is the speed at which the sample was recorded, and PLAY is the default playback speed attached to it. Below this row of headings are the eight lines of sample information.

Underneath the sample information is another line of titles labelled NOTE, FRQ, NOTE, FRQ, DRUM, SMP and FRQ. From left to right they are the key on which a synthesizer note is played, and its frequency or speed. There are two columns of information on synthesizer notes. Next to these is a column of information about drumkit data - The key on which that drum is played, its sample, and its frequency. Under these headings are the six and eight rows of data. The final piece of information is the default sample which is displayed at the bottom left of the screen.

EXAMPLES OF *LIST INFO* IN USE

```
:LIST INFO

:LIST INFO TO PRINTER

10 LIST INFO TO PRINTER:LIST INFO ON SCREEN
```

***LIST INFO* ERROR MESSAGES**

?SYNTAX ERROR. You have entered a word that the RAP4 Editor does not understand, or you have ommited part of the command.

?ILLEGAL DEVICE NUMBER. You have entered DISK or TAPE instead of PRINTER or SCREEN.

CHAPTER 16

HELP ON RAP4 COMMANDS

As I have mentioned at the beginning of this discussion of RAP4 BASIC, RAP4 has a powerful help facility which is a very useful aid for programming when you are first learning to use RAP4 BASIC. The command to operate the help function is appropriately enough HELP and its syntax is shown below.

```
:HELP RAP4/LOAD/SOUND/DEFAULT/LIST
```

The first - HELP RAP4 is a little different to the others - It redisplays the startup screen which shows the copyright message and all the available help. The others show the syntax of the command they refer to and a short summary of that command's function. The help it gives is shown below as quick reference for RAP4 BASIC.

HELP LOAD

```
LOAD SAMPLE "NAME" (USING TAPE/DISK)
     SYNTH  "NAME" (USING TAPE/DISK)
     MELODY "NAME" (USING TAPE/DISK)
```

ACTION: LOADS FILE FROM TAPE OR DISK

HELP SOUND

```
SOUND SAMPLE SMP# (USING SPEED SPD#)
      NOTE   "ID" (USING SAMPLE SMP#)
      DRUM   "ID"
      MELODY      (USING SAMPLE SMP#)
```

ACTION: PLAYS THE SPECIFIED EFFECT

HELP DEFAULT

```
DEFAULT SAMPLE SMP#
```

ACTION: SETS UP THE DEFAULT SAMPLE

HELP LIST

```
LIST INFO (USING SCREEN/PRINTER)
```

ACTION: LISTS SAMPLE INFORMATION

With that we come to the end of the tutorial section of this manual. The remainder is made up of the RAP4 Editor quick reference section and the various appendices I have mentioned throughout this manual. Def Rapping!

APPENDIX A

DISK ERROR MESSAGES

20 READ ERROR (Header Block Not Found)

The header of the requested data block could not be found by the Disk Operating System (DOS). Either an illegal sector number was sent in error, or the header block is corrupt.

21 READ ERROR (Sync Marker Not Found)

The sync marker of the requested track could not be found by the DOS. This error occurs when no disk is in the drive, or that disk is not formatted. Alternatively it is an indication of misaligned heads.

22 READ ERROR (Data Block Not Found)

The data read from a sector within a file has been corrupted.

23 READ ERROR (Data Block Checksum Error)

The checksum read from a sector did not match the checksum of the data read indicating a corrupt sector.

24 READ ERROR (Data Block Decoding Error)

In the conversion between GCR to Binary an error occured. This indicates that a byte of data within the requested sector is corrupt.

25 WRITE ERROR (Verification Of Data Error)

When verified, the data byte being written to the disk did not matc the data in the disk-drive memory. This can be caused by a physically damaged disk and results in an unclosed (asterisked) file.

26 WRITE PROTECT ON

The disk in the drive has a write protect tab over its write slot so cannot be used for writing data to.

27 READ ERROR (Header Block Checksum Error)

The checksum on the header block of the sector being read ia incorrect indicating a possibly corrupt sector.

28 WRITE ERROR (Data Block Overflow)

The sync mark of the next header block could not be found. This indicates either an incorrectly formatted disk or a disk-drive hardware problem.

29 DISK ID MISMATCH

The disk ID found on the disk did not match the one in the disk-drive RAM. This means that either the disk has been changed without the disk-drive's attention or the header block has been corrupted.

30 SYNTAX ERROR (General)

The DOS does not understand the command that was sent to it by the Plus/4 operating system - usually caused by data transfer not occuring properly.

31 SYNTAX ERROR (Command Not Valid)

The command sent to the disk-drive via the Plus/4 operating system is not recognised. See above.

32 SYNTAX ERROR (Command Too Long)

The command sent to the disk-drive was longer than 58 characters. This is most often caused by a carriage return not being received correctly.

33 SYNTAX ERROR (Invalid File-name)

The file-name sent to the disk-drive is not allowed. This is caused by typing a question-mark or asterisk as part of the save file-name.

34 SYNTAX ERROR (Missing File Name)

A file-name was not sent to the disk-drive when it is needed. This is probably because you have hit RETURN accidentally when entering the save file-name.

39 SYNTAX ERROR (Invalid command)

The command sent to the disk-drive was not recognised by the DOS.

50 RECORD NOT PRESENT

This message indicates that an access has been made to a non-existent record in a relative file. It is very unlikely that this error will occur when using RAP4 unless your disk-drive has an electronic fault.

51 OVERFLOW IN RECORD

Too long a record has been written to a relative file. See note above with reference to RAP4.

52 FILE TOO LARGE

While writing to a relative file, a record has been written that exceeds the valid file-size. See note above for RAP4.

60 WRITE FILE OPEN

In loading data from the disk-drive a load file has been specified that has not been closed properly (Appears as an asterisk in the directory).

61 FILE NOT OPEN

In reading data from a disk, a file has been specified that is not open. This is most likely caused by switching disks.

62 FILE NOT FOUND

You will probably encounter this error quite often. It indicates that the file-name you have specified is not present on the disk in the drive.

63 FILE EXISTS

You have tried to save a file onto a disk on which a file by that name already exists. The remedy is to precede the file-name with an "@"symbol.

64 FILE TYPE MISMATCH

While loading a file from disk you have specified a file-name that refers to a program, user or relative file rather than a sequential file such as those used by RAP4.

65 NO BLOCK

While writing a file to the disk a sector that is non-existent was specified. This may occur when the disk has been corrupted, or is full up.

66 ILLEGAL TRACK AND SECTOR

The next sector in a chain occupied by a file does not exist. This is most often caused by a corrupted or unclosed file but sometimes may be caused by a completely corrupted sector.

67 ILLEGAL SYSTEM T OR S

While trying to follow the path of a file on the disk, the DOS was forced to attempt to access a non-existent sector.

70 NO CHANNEL

While accessing a data-file, a communications channel was specified that is already in use. Alternatively, all channels are occupied indicating that five sequential files are already open.

71 DIRECTORY ERROR

The Block Availability Map (BAM) in the disk-drive memory has been corrupted. This is normally caused by it being overwritten in RAM and does not often occur because of a corrupt disk.

72 DISK FULL

Either all the data blocks on the disk in the drive are now occupied, or 144 files are present in the disk directory area.

73 DOS MISMATCH (73 CBM DOS V2.6 1541/TDISK)

This message occurs when you try to write data to a disk that has been formatted using a format which is only read-compatible. On many disk-drives this message may occur when the drive is switched-on and can be ignored. When using RAP4 it can also occur when you attempt to write to the RAP4 System disk.

74 DRIVE NOT READY

There is either no disk in the disk-drive, the turnkey is not shut, or the disk is not inserted properly.

APPENDIX B

OPERATING SYSTEM ERROR MESSAGES

ERROR NUMBER $00 While accessing a disk either by loading or saving, the RUN/STOP key was pressed terminating the operation.

ERROR NUMBER $01 In the process of opening a file for disk operations the program has exceeded the number of open files allowed.

ERROR NUMBER $02 The logical file that the program attempt ed to open is in fact already open.

ERROR NUMBER $03 While attempting to read data from a logical file it was found that the file was no longer open.

ERROR NUMBER $04 The file you tried to open for reading data from does not exist on the disk-drive.

ERROR NUMBER $05 The specified device (Disk-drive from the RAP4 Editor) is not plugged into the Plus/4. This may also be caused if you are using a TTL4 interface switched-on while attempting to use the disk-drive.

ERROR NUMBER $06 The device from which the program is attempting to read data is not an input device.

ERROR NUMBER $07 The device to which the program is trying to write data is not an output device.

ERROR NUMBER $08 No file-name was given for an operation which required a file-name. This usually occurs when trying to save a file to disk with no name.

ERROR NUMBER $09 The device that has been specified for loading or saving is a device that cannot be used for that purpose.

ILLEGAL FILE TYPE ERROR You have tried to load for instance a sample file as if it were a melody or synthesizer file or vice versa.

APPENDIX C

RAP4 SOUND SAMPLER INFORMATION

SETTING	SAMPLE-SPEED (Baud)	BANDWIDTH (Hz)	TIME(1k) (Mins)	TIME(32k) (Mins)	TIME(48k) (Mins)
$FF	56988	28494	0m 0.14s	0m 04.6s	0m 06.90
$FE	48545	24273	0m 0.16s	0m 05.4s	0m 08.10
$FD	42974	21487	0m 0.19s	0m 06.1s	0m 09.15
$FC	37992	18996	0m 0.21s	0m 06.9s	0m 10.35
$FB	34045	17023	0m 0.24s	0m 07.7s	0m 11.55
$FA	30840	15420	0m 0.26s	0m 08.5s	0m 12.75
$F9	28494	14247	0m 0.28s	0m 09.2s	0m 13.80
$F8	26214	13107	0m 0.31s	0m 10.0s	0m 15.00
$F7	24273	12136	0m 0.33s	0m 10.8s	0m 16.20
$F6	22599	11300	0m 0.36s	0m 11.6s	0m 17.40
$F5	21141	10571	0m 0.38s	0m 12.4s	0m 18.60
$F4	19859	9930	0m 0.41s	0m 13.2s	0m 19.80
$F3	18859	9430	0m 0.43s	0m 13.9s	0m 20.85
$F2	17833	8917	0m 0.45s	0m 14.7s	0m 22.05
$F1	17022	8511	0m 0.48s	0m 15.4s	0m 23.10
$F0	16182	8091	0m 0.50s	0m 16.2s	0m 24.30
$E0	9134	4567	0m 0.89s	0m 28.7s	0m 43.05
$D0	6394	3197	0m 1.28s	0m 41.0s	1m 01.50
$C0	4918	2459	0m 1.66s	0m 53.3s	1m 19.95
$B0	3978	1989	0m 2.05s	1m 05.9s	1m 38.85
$A0	3352	1676	0m 2.44s	1m 18.2s	1m 47.30
$90	2900	1450	0m 2.82s	1m 30.4s	2m 15.60
$80	2545	1273	0m 3.21s	1m 43.0s	2m 34.50
$70	2272	1136	0m 3.60s	1m 55.4s	2m 53.10
$60	2053	1027	0m 3.99s	2m 07.7s	3m 11.55
$50	1872	936	0m 4.37s	2m 20.0s	3m 30.00
$40	1613	807	0m 4.76s	2m 32.5s	3m 48.75
$30	1592	796	0m 5.14s	2m 44.7s	4m 07.05
$20	1478	739	0m 5.54s	2m 57.4s	4m 26.10
$10	1380	690	0m 5.93s	3m 10.0s	4m 45.00
$00	1298	649	0m 6.31s	3m 22.0s	5m 03.00

APPENDIX D

RAP4 BASIC COMMAND ABBREVIATIONS

LOAD COMMAND

```
LOAD SAMPLE/SYNTH/MELODY "NAME" (USING [TAPE/DISK])

L<SHIFT-O> SAMPLE/SYNTH/MELODY "NAME" (US<SHIFT-I> [TAPE/DISK])
```

SOUND COMMAND

```
SOUND SAMPLE SMP#  (USING SPEED SPD#)
      NOTE   "KEY" (USING SAMPLE SMP#)
      DRUM   "KEY"
      MELODY       (USING SAMPLE SMP#)

S<SHIFT-O> SAMPLE      SMP#  (US<SHIFT-I) SPEED SPD#)
           N<SHIFT-O>E "KEY" (US<SHIFT-I) SAMPLE SMP#)
           DRUM        "KEY"
           MELODY            (US<SHIFT-I) SAMPLE SMP#)
```

DEFAULT COMMAND

```
DEFAULT SAMPLE SMP#

D<SHIFT-E>AULT SAMPLE SMP#
```

LIST COMMAND

```
LIST INFO (USING [SCREEN/PRINTER])

L<SHIFT-I) INFO (US<SHIFT-I> [SCREEN/?ER])
```

HELP COMMAND

```
HELP RAP4
     LOAD
     SOUND
     DEFAULT
     LIST

HE<SHIFT-L> RAP4
            L<SHIFT-O>
            S<SHIFT-O>
            D<SHIFT-E>FAULT
            L<SHIFT-I>
```

Note that when a command requires a USING clause it can be replaced with ON, FROM or TO for more logical language or even shorter abbreviation.

RAP4 EDITOR QUICK REFERENCE GUIDE

"SPEED" SCREEN

- SPEED +

The SPEED button, which is divided into two parts, is used to decrease and increase the speed of pointer movement. Note that no changes in speed take place during alteration.

REDEFINE

The REDEFINE button, which is found on many of the RAP4 Editor's screens is used for "locking-in" any changes you have made to the pointer speed.

QUIT

The QUIT button which is found on most of the RAP4 Editor screens is used to return to the main screen from which all of RAP4's functions can be accessed through the pull-down menus.

"STORAGE" SCREEN

[DISK/TAPE] <>

This window/button combination is used for displaying and choosing whether any save or load operations will use the Datasette or Disk-drive. To toggle between the two, click on the button to the right.

SAVE LOAD SAMPLE

These two buttons - SAVE and LOAD are used for saving or loading sample data using tape or disk. When loading from disk you are asked to specify a file-name.

SAVE LOAD SYNTH.

These two buttons are used to save and load synthesizer setups. Note that you must always specify a file-name when saving either to tape OR disk.

SAVE LOAD MELODY

These two buttons are used for saving and loading melodies. Like the synthesizer buttons you must specify a file-name when saving, or loading from disk.

QUIT

The QUIT button, as on all the other RAP4 screens, is used to return to the main screen.

YES NO QUIT

While attempting to load a file from tape, when a valid file is found, two extra buttons are displayed marked "YES" and "NO". If the file is the one that you wish to load then click on YES, if not, click on NO. If you wish to abort the load then click on QUIT to return to the Storage screen.

OK

This button, which only appears when a disk error has occured, is used to acknowledge the error and to return to the Storage screen.

DIRECTORY

The DIRECTORY button is used to enter the Directory screen and to display the contents of the disk in your disk-drive.

REPEAT RETURN

These two buttons, which are only displayed when in the Directory screen, are used to respectively reprint the disk directory and to return to the Storage screen.

"ABORT" SCREEN

QUIT

The QUIT button simply returns you to the main screen leaving data and program intact.

ABORT

The ABORT button, which should only be selected if you are absolutely sure about doing so, is used to exit the RAP4 Editor and return to BASIC. Clicking on the ABORT button has the same effect as pushing the Reset switch on the side of your computer.

"MONITOR" SCREEN

MONITOR

The MONITOR button activates the audio monitor. If you are using the Deluxe Edition Editor, don't forget to activate your TTL4 interface. If using the Commodore Datasette, you must press the PLAY button on it. When you have finished monitoring, press the STOP button on your Datasette. (The RUN/STOP key on the Plus/4 if you are using the Deluxe edition Editor.

QUIT

The QUIT button simply returns you to the main screen.

"SAMPLER" SCREEN

[RECORD: $NN] **- +**

The button marked "- +", which is positioned next to the window showing recording speed, is used to decrease and increase the speed at which any sampling will be performed.

[PLAY: $NN] **- +**

The button next to the Playback speed window does the same thing as the button next to the Record speed window, but is used to decrease and increase the speed at which a sample will be played-back.

RECORD

The RECORD button is used to activate the RAP4 Editor's sampling function. Remember that once you have recorded over a sample you cannot get it back, so only select this button once you are ready to do so.

PLAY-BACK

The PLAY-BACK button is used to playback a sample previously recorded using the RECORD button. The sample is played back at the speed currently shown in the Playback speed window.

REDEFINE

The REDEFINE button can be used to "attach" the record and playback speeds currently shown on-screen to the currently selected sample. In this way you don't have to keep on changing these settings every time you use the Sampler.

QUIT

The QUIT button exits the Sampler screen and returns you to the main screen.

"REVERSE" SCREEN

REV.

The REV. or REVERSE button is used to reverse the sample currently highlighted in the sample information window. Every time you click on this button the sample is reversed so to restore a sample to normal, click on the button twice - You cannot corrupt any data with this button.

PLAY

The PLAY button simply plays back the currently selected sample (reversed or not). The playback speed used is that attached to the sample using the Sampler screen.

QUIT

The QUIT button is used to leave the Reverse screen and return to the main screen.

"SETUP" SCREEN

< START >

The START button, which is divided into two halves, is used to decrease and increase the sample start address shown in the window above the button. Note that when altering the start and end addresses, no changes are made permanent until you click on REDEFINE.

< END >

The END button works in the same way as the START button but is used to alter the sample end address.

NAME

The NAME button allows you to change the name given to the sample currently highlighted in the sample information window. When you click on it, a window is opened and you can then enter your new name at the keyboard.

[HI/LOW] <>

This window/button combination is used to select whether, when changing the sample start and end addresses, the HIgh byte of the address is incremented and decremented, or the LOW byte. To toggle between the two, click on the <> button in the same way as for selecting tape or disk in the Storage screen.

REDEFINE

The REDEFINE button is used to setup any changes that you have made to start & end addresses or names. Note that to restore the values shown in the window above to those currently setup in a sample, you can click on that sample in the sample information window.

QUIT

The QUIT button returns you to the main screen leaving data intact if you have not used the REDEFINE button.

"ERASE" SCREEN

ERASE

The ERASE button is used to erase from memory the sample highlighted in the sample information window. This process can not be remedied when it has been carried-out, so use this button with extreme care if you have any important samples in memory.

QUIT

The QUIT button simply returns you directly to the main screen.

"EDITOR" SCREEN

< MOVE >

The MOVE button is used to move the Edit cursor backwards and forwards through the sample currently being edited. RAP4 ensures that you cannot exceed the start or end addresses of that sample.

- AMP +

The function of the AMP button is to allow you to increase or decrease individual amplitude levels for each byte of sample. RAP4 makes sure that you don't decrease the amplitude below zero or increase it above eight.

START

The START button is for setting the start address of the current sample. Note that using the START and END buttons, you can only decrease the size of a sample - For extending it use the Setup screen.

END

The END button is used to set the end address of the current sample in the same way that START is for setting the start address.

PLAY

The PLAY button can be used to play the sound enclosed between the >> and << markers for seeing what different portions of a sample sound like.

REDEFINE

The REDEFINE button is for redefining a sample's start and end address to those indicated by the >> and << markers in the same way that it is used in the Setup screen for "locking-in" attributes.

QUIT

The QUIT button returns you to the main screen.

"NOTES" SCREEN

- FREQUENCY +

The FREQUENCY button is used to decrease and increase the frequency or playback speed of the synthesizer note currently highlighted on-screen. Unlike other alterations, frequency changes do not need to be locked-in using a Define button

PLAY NOTE

When you click on the PLAY NOTE button, the note currently highlighted is played-back as if you had hit that key from the Synthesizer.

QUIT

The QUIT button exits the Notes screen and returns you to the main screen.

"DRUMS" SCREEN

- SAMPLE +

The SAMPLE button, which is in two parts, is used to increase or decrease the number of the sample that is programmed into the drum currently highlighted on-screen.

- FREQUENCY +

The FREQUENCY button works like the Frequency button on the Notes screen and is used to increase or decrease the frequency of the sample programmed into the current drum.

PLAY DRUM

The PLAY DRUM button is the same as the PLAY NOTE button on the Notes screen, and is used to play the drum currently highlighted as if the key for that drum had been hit from the Drumkit screen.

QUIT

The QUIT button is used to return to the RAP4 Editor main screen.

"SYNTHESIZER" SCREEN

SYNTHESIZER

The SYNTHESIZER button is used to activate the synthesizer keyboard. Once it has been selected, the keys shown on-screen are used to play the synthesizer. Pressing the "ESC" key returns you to the normal Synthesizer screen.

QUIT

The QUIT button is used to return to the main screen when you have finished using the synthesizer.

"DRUMKIT" SCREEN

DRUMKIT

The DRUMKIT button, like the SYNTHESIZER button on the Synthesizer screen, is used to activate the drumkit. Once it has been selected, the keys shown on the drumkit diagram in the top-right of the screen can be used to play individual drums. Pressing "ESC" returns you to the normal Drumkit screen.

QUIT

The QUIT button returns you to the main screen once you have finished using the drumkit.

"SEQUENCER" SCREEN

< MOVE >

The MOVE button allows you to move forwards and backwards through a melody. As you move the previous note will be played giving you an idea of the tune and RAP4 ensures that you do not go beyond the end or before the start of the melody area.

REPLAY

The REPLAY button is used to playback the melody currently stored in memory. The RAP4 Editor automatically detects where the end of the melody is and plays up to that point only.

SILENCE

The SILENCE button, which is used in conjunction with the main entry console at the bottom-right of the screen, is used to insert a period of silence into a tune. To enter notes or drums, click on the keys or drumpads displayed in the main console.

FINISH

The FINISH button performs the same action as the QUIT button on other screens in that it returns you to the main screen.

"CLEAR" SCREEN

CLEAR

The CLEAR button is used to clear the melody area of all notes and drums. Once it has been selected you can not recover your melody so use this button with care.

QUIT

The QUIT button as on all screens returns you to the main screen.

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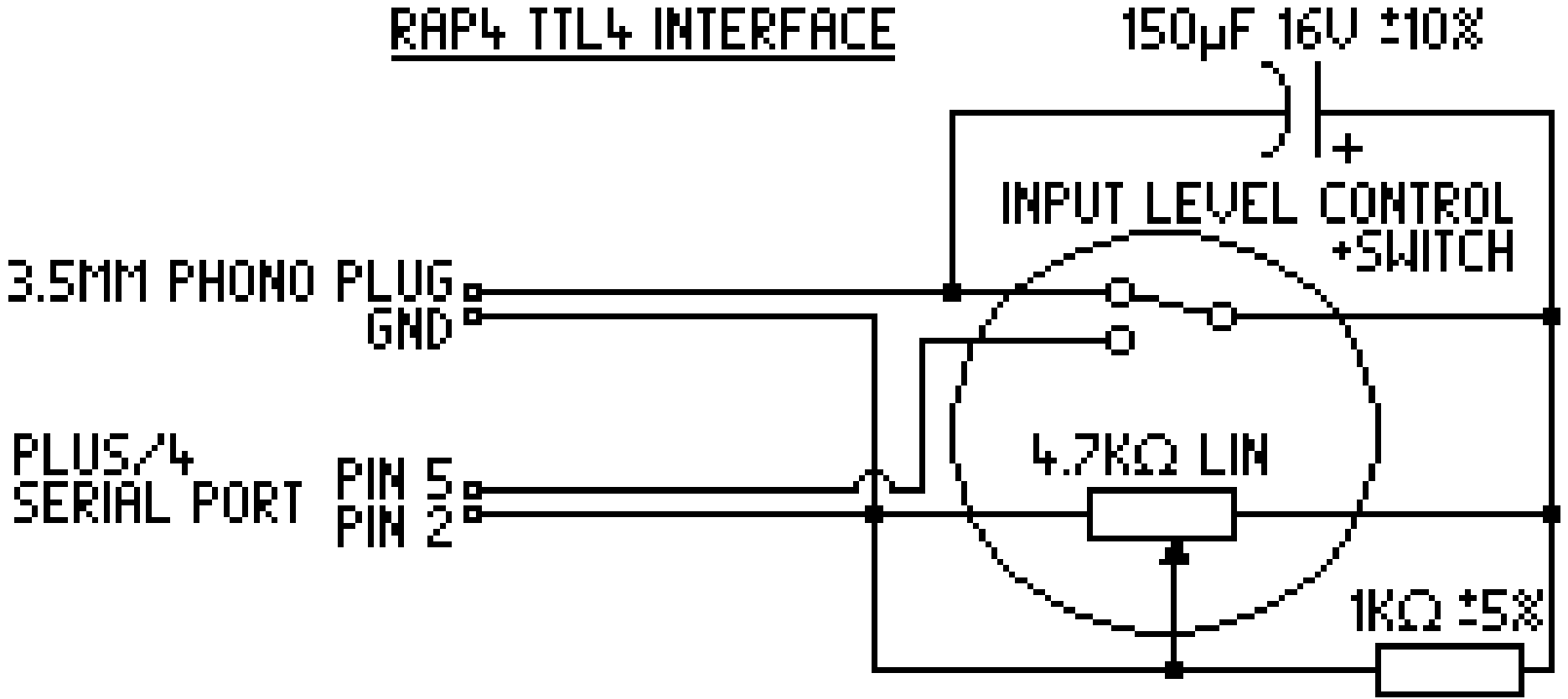
RAP4 TTL4 INTERFACE